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CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society Of America

Vol. XV MARCH, 1943 No. 3

FIG. 14. *Bowiea volubilis* is a South African plant from the Liliaceae family. The vine dies down during the summer. Photo courtesy "The Flower Grower."

CACTUS AND SUCCULENT JOURNAL

Published and Owned by the Cactus and Succulent Society of America, Inc., Box 101, Pasadena, California. A monthly magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. Subscription $3.00 per year. Foreign $3.00 per year by international money order. Membership in the Cactus Society free with subscription. Mail application to SCOTT HASELTON, *Editor*, Box 101, Pasadena, Calif. *Editorial Staff:* THE ENTIRE SOCIETY. Entered as Second Class Matter at Pasadena, Calif., under act of March 3, 1879.

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To ALAIN WHITE and BOYD L. SLOANE

It is with much pleasure that I have to inform you that the Council of the South African Biological Society decided to make a special award of its medal, "The Capt. Scott Medal," individually, for your contributions to South African botany. Since the medal was instituted there has been only one award each year, and only on two occasions has the medal been awarded outside Africa. In 1927 it was awarded to Mr. E. Meyrick, for his work in entomology, and in 1921 to the late Dr. N. E. Brown for his work on the South African Flora.

I mention these facts to indicate that the Society, in recognizing the magnificent work you have done on the *Stapelieae* and the *Succulent Euphorbieae,* have acted without precedent. The Council felt that it was expressing the wish of all South Africans interested in the biological sciences by recognizing your services to our country.

You will also be glad to learn that Dr. R. A. Dyer will be the recipient of the Society's annual award of the Capt. Scott Medal.

That it has fallen on me the Hon. Secretary of the Society to advise you of the award has added to the pleasure I feel in the award.

I am extremely pleased that the South African Biological Society has seen fit to recognize your services to the botany of our country, which we all so much appreciate.

DR. E. PERCY PHILLIPS.

COMMON NAMES

The list of common names of cacti and succulents in the January JOURNAL has brought encouraging response. We appreciate the suggestions in revising the list published and the many additions that are still being sent in. We want to encourage the listing of appropriate common names that will stick but we hesitate to list common names that have been coined to sell a plant unless that name has merit. For instance, some of the common names are used only once in a catalog and then it appears with a brand new common name. It is to the interest of everyone to popularize one name by which beginners can definitely depend on a certain plant.

Let's have more common names so our next list will be as complete as possible.

ARTIFICIAL LIGHTING

E. G. Rowell of Rochester, N. Y., has brought up again the subject of artificial light to retain the coloring in succulents. Mrs. Lewis and others have sent in comments from time to time. Have you anything to add to this subject before it is reviewed in the JOURNAL?

THE CACTUS AND OTHER SUCCULENT LEAGUE—OAKLAND

The February meeting of the Oakland Affiliate was held at the garden of President Mrs. W. E. Newlon. Mr. Butterfield gave an interesting lecture on the less known succulents, with plant material on display.

Mr. A. Tresler, S. Isics and J. Hitchcox were appointed to make plans for a cactus and other succulent exhibit in down town Oakland on a future date. The exhibit is to take the place of our annual display and will be in conjunction with the Spring Garden Show which was cancelled for the duration.

Our March meeting at the home of W. Andrews was held March 4, with rather poor attendance due to poor travel facilities. The meeting was given over to display and discussion of plants in general. Our next meeting will be held at the Botanical Garden of the University of California in Berkeley.

For information regarding our club, address 5161 Trask St., Oakland, Calif.

G. W. VAN DER BUNDT, *Corresponding Secretary.*

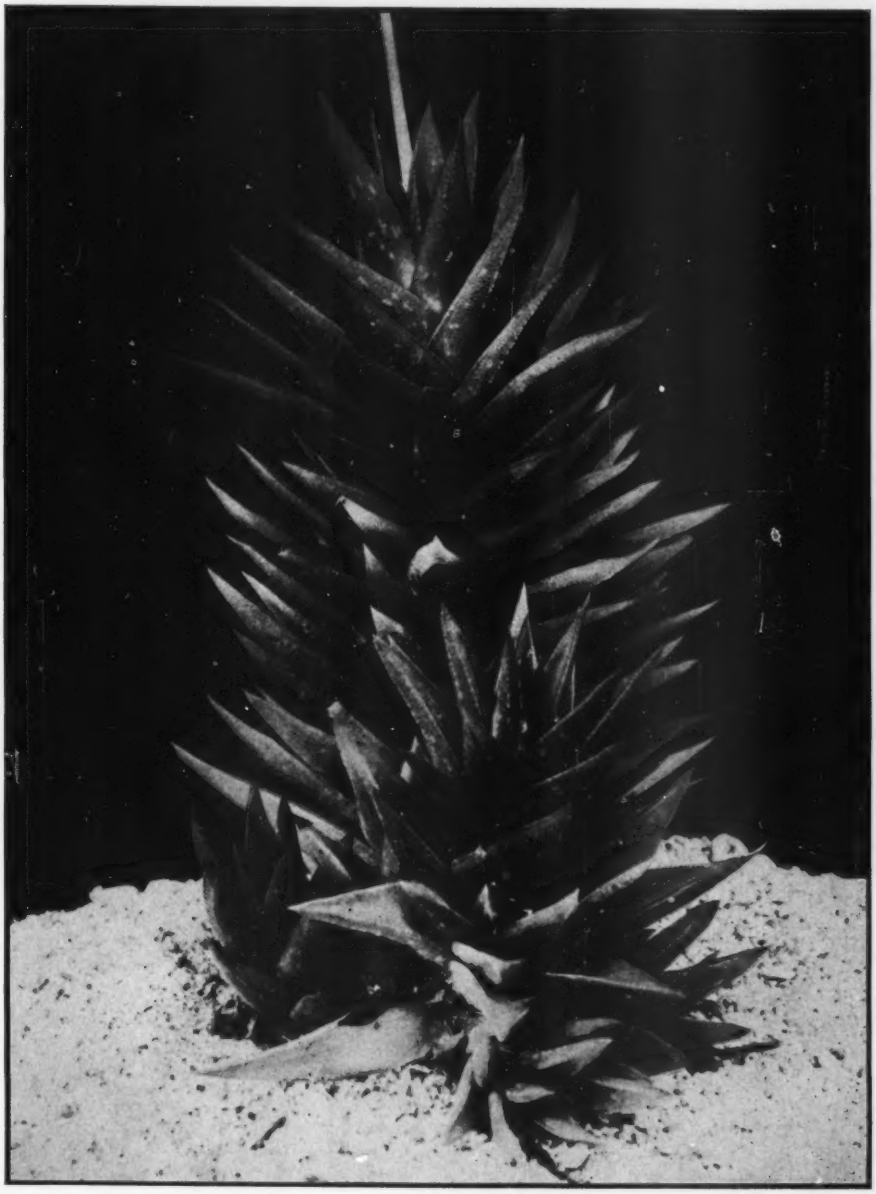

FIG. 15. *Apicra pentagona* (Haw.) Willd. nat. size.

Notes on Apicras

By J. R. BROWN

Apicra pentagona (Haw.) Willd. in Berl. Mag. V (1811) 273; Bak. in Journ. Linn. Soc. XVIII (1880) 217; Berger in Pflanzenr. IV 38. (1908) 117.—*Aloe pentagona* Haw. in Trans. Linn. Soc. VII (1804) 7; Salm Dyck, Monogr. (1836-63) sect. 1, fig. 4.

Plant with erect leafy stems, 10-20 cm. tall, 6-8 cm. in diam., branching from the base and forming a dense cluster.

Leaves in 5 straight or spiral rows, closely

crowded, erect spreading, 4 cm. long, 15 mm. wide towards the base, lanceolate-deltoid, acuminate, with pungent tips, bright green, face of leaves flat or slightly convex, back rounded, obliquely keeled or doubly keeled in the upper part and with more or less irregularly scattered, small, whitish, not very prominent tubercles, the margins and keels minutely, crenulately roughened.

Peduncle simple or branched, including the raceme 40 cm. and more tall; the lanceolate-deltoid bracts 4-5 cm. long, the pedicels about the same length; perianth about 14 mm. long, greenish, with short, obtuse segments.

Locality: Type locality unknown.

Probably introduced to cultivation in Europe about 1800.

Apicra pentagona (Haw.) Willd. is described as a plant with strict or only very slightly spiral rows of leaves and Salm Dyck's fig. of this plant shows the leaves in exactly straight ranks. However, this character of exactly superimposed leaves in strict rows is not a constant one, indeed, the opposite would appear to be the case, and this would seem to apply to nearly all Apicras and Haworthias described as having exactly straight rows of leaves. Innumerable plants of *Apicra pentagona* have been examined and also have been grown by the writer over a period of many years and while a large percentage of young plants may retain the leaves in straight rows, the rows of leaves may become very spiral indeed as the plants become older.

The color of the plant varies according to the light conditions under which it is grown. Under glass and in considerable shade the color of the leaves is a paler green and the spots or low tubercles are hardly noticeable, as the light intensity increases the color changes until, when grown in the open in full sunshine the color is a reddish brown and the tubercles become quite whitish and the margins of the younger leaves show a continuous white line.

This Apicra flowers in So. California during July and August and the flowers are a yellowish green in color and when the plant is grown fully exposed to the sun the perianth segments are scarcely opened, remaining more or less erect and not spreading.

FIG. 16. A young plant of *Apicra pentagona* (Haw.) Willd. showing the leaves in straight rows. FIG. 17. Flowers of *Apicra pentagona* (Haw.) Willd. from a plant grown under glass, nat. size.

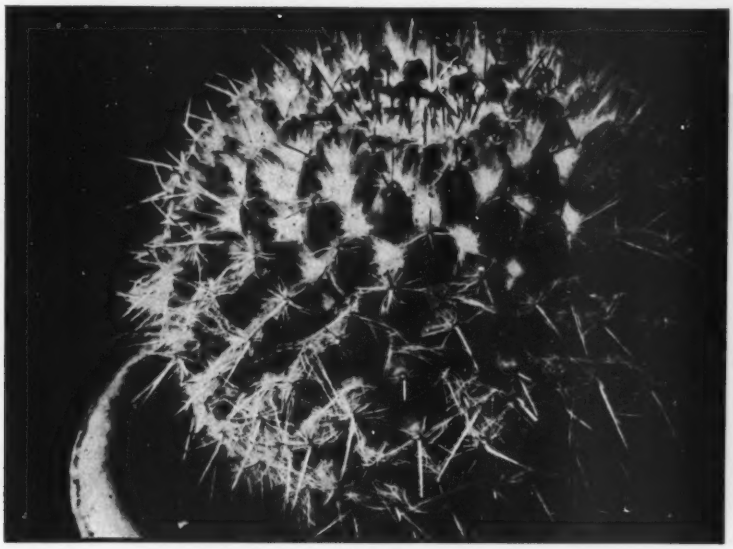

FIG. 18

Mammillaria Woodsii sp. nov.

By DR. R. T. CRAIG

Corpus simplex, mamillae infra angulares, apicibus teretes, succus lacteus; axillae lana alba et setis; spinae centrales 2-4, 4-5 mm., rectae, cretaceae; spinae radiales 25-30, 4-8 mm., pili simili tenue; flores infundibuliformes, sepalae lanceolatae, ciliatae, puniceis obscuris; petalae ovatae, puniceis obscuris; stigmata 3, fusca punicea; semina fusca.

Body simple, flattened globular to clavate, apex considerably sunken, diameter 80 mm., height 35 mm.

Tubercles arranged in 13 and 21 spirals, hidden by dense white wool and bristles in axils, dull grass green; angled below, apex nearly rounded, strongly keeled ventrally; sap milky, length ap. 7 mm., diameter at base 6-7 mm.

Areoles oval, white woolly, soon naked.

Axils flowering and fruiting ones with dense white wool almost covering the apex of tubercles, numerous white hairlike bristles to 25 mm.

Central spines mostly 2, occasionally to 4, lower to 16 mm., upper ones 4-5 mm.; lower slender subulate, upper heavy acicular; smooth, mostly straight or very slightly curved; dull chalky, purplish pink, tip black; lower directed ventrally, uppers directed fanlike dorsally.

Radial spines 25-30, 4-8 mm., fine hairlike, smooth, tortuous, not stiff, white, somewhat ascending.

Flowers March and April, length 10-12 mm., width 12-15 mm., funnelform.

Outer perianth segments brownish dark pink mid stripe, pale pink margins; lanceolate, tip acute, margins fine serrated, 2 mm. wide.

Inner perianth segments dark pink, tapering mid stripe to tip, pink margins; elliptical, tip obtuse, margins mostly entire.

Anthers yellow; *Filaments* white below, pink above; *Style* pale pink.

Stigma lobes 3 pale brownish pink, 1 mm. long, 1 mm. above anthers.

Fruit deep pink, 15x6 mm., clavate.

Seed brown, dull, curved pyriform, lateral navel, faintly pitted.

Distribution: Guanajuato.

Type locality: Hacienda de Tarajeas.

This species was discovered by Ferdinand Schmoll, of Cadereyta, Queretaro and sent to us in 1936. It has been named in honor of Mr. Robert S. Woods of Azusa, California, for his

enthusiastic efforts in the culture and research of the cactaceae. The type specimen has been deposited in the U.S. National Museum Herbarium as *Mammillaria Woodsii* on sheet No. 1791490.

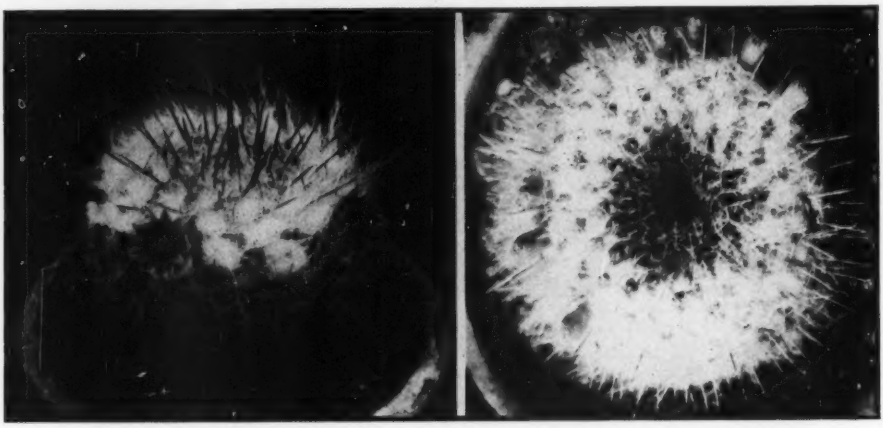

FIG. 19. *Mammillaria Woodsii* sp. nov. in flower and top view showing fruit.

GRAFTED EPIPHYLLUM

I have read with interest a number of the magazines published by your society and thought that you might be interested in hearing about an Epiphyllum that I grafted on a spineless cactus. Last year many people, some who were Epiphyllum growers, came to see this plant when it was in full bloom and all pronounced it the most wonderful Epiphyllum that they had ever seen here in Southern California.

This plant was grafted four years ago on an ordinary spineless Opuntia. The first year it did not bloom; the second year it had thirty blooms; the third year it had over two hundred and twenty blooms; this year we expect still more, as the plant is much larger. Many of the blooms measured over nine inches in diameter. For a period of three weeks last year, there were over forty blooms on the plant all the time. The plant covers a trellis eight feet tall and sixteen feet long and is still growing strong.

MURRAY J. BLACK.

FROM AUSTRALIA

Just a line or two with my subscriptions to say the "Cactaceae" and the 2 volumes of the "Euphorbieae" arrived safely and are now amongst my most treasured possessions.

The "Euphorbieae" is easily the most valuable work which has been published on the subject and is written in such a way that even the most non-botanical reader can find it a very great help. Just about the only thing it lacks is a "Key to Species" and I think if one were published it would be in great demand as it appears as though about 50% of our names are incorrect and a key would help us to straighten them out. The "Euphorbieae" is extremely well arranged and printed and the price most reasonable.

As regards the "Cactaceae" your Marshall and Bock ought indeed to be proud of it as the printing, photographs, and letterpress is superb. I was delighted to see Mr. Marshall has made a valiant effort to simplify the classification. It is a step in the right direction and I for one will endeavor to further its use and will adopt it myself.

It is an excellent idea to publish Addenda to it at various times. If it were done on similar lines to the "Bulletin of Kaktus Research" I would gladly subscribe to it. The suggested work on the Mammillarias would be a godsend and I am sure it would find a ready sale as so much interest is taken in them.

J. CECIL JOHNSON.

NEW BOOK SPECIALS

The 12 AMATEUR BULLETINS of 1942 are bound in cloth to match the JOURNALS. Every word is understandable with common names predominating. Culture and helpful hints for beginners are emphasized with 150 illustrations —some in color. The article on succulent corsages is alone worth the price of $2 postpaid in U. S. A. After the war this popular magazine will be continued. Buy Vol. I NOW. Remember, Vol. I of the JOURNAL is $25 when available.

TWO MONOGRAPHS AVAILABLE

The three volume "Stapelieae" (1200 pages, 1250 illustrations) by White and Sloane and the two volume "Euphorbieae" (1000 pages, 1100 illustrations) are now offered on a painless purchase plan of $2.50 per month for 10 months. This generous plan is made possible because Mr. White is anxious to have these books in the hands of ALL plant lovers who are interested in these monographs.

Now is the time to add 2200 pages to your library while they are still available. It is so easy to be sorry tomorrow that you did not buy these valuable books at the actual printing cost. They were painstakingly prepared for your enjoyment. Get your sets now. Box 101, Pasadena.

SPINE CHATS

LADISLAUS CUTAK

Only recently, Dr. Leon Croizat has described two new species of *Pedilanthus,* in his "Notes on American Euphorbiaceae" written for the JOURNAL OF THE WASHINGTON ACADEMY OF SCIENCES (33: 11-20, January 1943). *Pedilanthus* is an interesting genus of the Spurge Family, its members popularly called "Slipper-flowers," on account of the slipper-shaped inflorescences. I am extremely interestd in the Pedilanthi, striving to bring more of these plants into cultivation. Sadly, only a few species are cultivated at present, the commonest being *P. tithymaloides,* found in gardens throughout tropical America. The Missouri Botanical Garden has about as fine a collection of these living plants as any other institution; yet numerically it is rather small, including only the following species: *P. angustifolius* from Puerto Rico, *P. bracteatus* from Mexico, *P. macrocarpus* from Lower California, *P. tithymaloides* from the American Tropics, and the doubtful *P. Smallii* and its variegated variety from Florida. When I was in Mexico, I tried hard to locate some of the native Pedilanthi in their type localities, but unfortunately was not successful. The "slipper spurges" often grow in the company of other typical scrub, and their stems (especially when leafless) often are hard to distinguish in the brush.

Dr. Croizat's new species include the Mexican *P. coalcomanensis* and the Honduran *P. personatus.* The former grows in woods in the vicinity of Coalcoman, Michoacan, where it assumes a height of 15 feet and is locally known as "candelilla." The latter grows in semi-arid country around Comaguaya, in Honduras, where it is known as "ditamo real." It is shrubby in growth, attaining a height of 10 feet.

* * *

In the January, 1943, number of the CACTUS JOURNAL you were tipped about that very excellent monthly magazine, ARIZONA HIGHWAYS. I'd like to add my comments to that wise tip. Believe me, folks, you won't go wrong by subscribing to that pictorially perfect periodical. I guarantee you will get much enjoyment from the well-written articles and the cleverly chosen photographs. ARIZONA HIGHWAYS has taken me on many an interesting arm-chair journey through the picturesque state which it so aptly describes and advertises. Two years ago a copy reached my hands and before I got half through it, I found myself subscribing. Since then I eagerly await each issue.

ARIZONA HIGHWAYS is a magazine with a special appeal to the cactus and succulent plant fan. Witness the eight highly entertaining feature stories which appeared in the 1942 series. Briefly I review them for your attention. "The Wilderness of Unreality" was a story about the Saguaro National Monument, lavishly illustrated with wonderful snapshots of giant cacti and animal life that inhabits the reserve; "Mi Amigo, Saguaro" told the complete story about *Carnegiea gigantea,* the "king of cacti," and was likewise illustrated with unusual photos; "Goddess of the Night" was a word and picture portrait of the delicate desert queen, *Peniocereus Greggii,* whose loveliness is displayed when moonlight and stardust come at night; "The Lily of the Southwest" featured the stately yucca plant, the spring enchantress of the desolate wastes; "Furniture from Desert Skeletons" gave an interesting sidelight about a man whose hobby was fashioning furniture from cactus skeletons; "Cactus Dwellers" dealt with desert birds associated with our spiny pets; "The Southwestern Arboretum" told of a visit to the Boyce Thompson Southwestern Arboretum near Superior; and "Desert: Arizona Style" gave an approach to the mystery and the beauty of the desert. Take my word, "Arizona Highways" is a treat.

* * *

The cactus enthusiasts, who have not as yet availed themselves of a copy of WHAT KINDA CACTUS IZZAT? should do so as soon as possible. Scott Haselton will gladly supply you with a copy for the small price of $1.30 postpaid. This cartoon book has been reviewed previously in the CACTUS JOURNAL (February, 1942), but it still is that good, in my estimation, to receive mention here. Reg Manning, one of Southwest's best cartoonists, has done a masterful job with the subject, in a humorous style of course, but there are many enlightening facts disclosed.

I got many a belly-laugh from the clever cartoons. The most hilarious, in my opinion, is the one on page 8, which depicts a victim in excruciating pain, as a result of coming in contact with a prickly pear bush, some of the vicious joints still attached to his delicate rear extremity, while a studious cactus nut is busily examining the attached specimen with a hand lens and exclaiming: "Oh man! You're in luck! You've run into a rare species of Opuntia!"

* * *

Last month I had the pleasure of delivering an illustrated talk before the Poplar Bluff Garden Club at Poplar Bluff, Missouri. This Ozarkian town of 16,000 inhabitants, located some 165 miles south of St. Louis, boasts two other garden clubs whose members were invited to attend the meeting as guests and then to join in the garden forum which was conducted at the conclusion of the illustrated lecture. Needless to say, you can rest assured that I preached the gospel of the cactus and succulent plant cult as is expected of me and of the other Regional Vice-Presidents of the Cactus and Succulent Society of America. A number of cactus enthusiasts were contacted, their collections examined, and future prospects introduced to our pet plants.

The Feverstons possess a great number of the more common varieties, which at the time of my visit were stored in a cool cellar. Later, when warm weather arrives, the plants are set out in the ground in an open sunny location. The Feverstons, by the way, instilled the cactus mania in their two son-in-laws, Messrs. Ned Dare and Theo. Van der Hayden, who happen to be two of our staunchest members of the Henry Shaw Cactus Society.

* * *

Mrs. Elinor Sutton of Jefferson, Iowa, is a rather busy little woman in her part of the country. Besides conducting a thriving cactus business, she frequently travels to nearby towns to address garden clubs and in that way does her share in promoting interest in cacti, although she claims it is a sort of uphill job right now. Keep up the good work, Deputy Sutton, it will be rewarded. I'm proud to have you as my co-worker.

USES AND ABUSES OF VITAMIN B_1

(From GARDEN LIFE)

Now that the early furore has died down a bit, and actual results are being given their proper valuation, we can comment on Vitamin B_1 with some accuracy. The early results reported were just too good to be accepted as generally true. However, in the more cold light of the judgment of time there are some things that stand out.

This preparation is an excellent aid in transplanting. Used according to direction, and at the proper time, it will lessen the shock of the move and save many a plant that might be classed as "difficult." However, miracles not only should not, but must not be expected. The gardener cannot expect the vitamin to overcome careless handling of plants.

Soils that are well fertilized, particularly with manure, most probably contain enough of the vitamin in themselves and so no appreciable effect will be noticed in such areas. The poor soil, deficient in humus, is the one where an improvement in growth will be noted.

The vitamin seems to require an acid solution in order to be effective. The addition of a small amount of common vinegar would seem to supply this to an ample extent. About two tablespoonfuls would suffice. This will serve to offset the alkaline quality of the average of city waters, and is important.

In general it may be said that Vitamin B_1 is a new tool of great value when used properly, but it can no more be used as a universal magic wand, than can a large tractor be used in a city garden. All tools have value in proportion as the correctness of their use, and when properly utilized will give satisfaction.

SAND CULTURE

Should like to see an article or articles by your readers who have used the new "Sand Culture." I have used nutrient salts in conjunction with B_1, having plants potted in pure medium coarse sand for the past year. My plants have shown more healthy growth during this year than total growth for the preceeding three years when I used the standard soil mixture and pure water. It seems to me "Sand Culture" has several advantages over the standard culture. It minimizes the danger of over watering as excess water drains away almost immediately. The roots receive plenty of air and root growth is amazing.

Our winters in Maine are long and usually severe. At the present writing it is 20 degrees below zero. For this reason we must use extreme caution in watering succulent plants in the winter. "Sand Culture" is a help in this respect as the excess water drains off so rapidly.

I have not been bothered with Green Algae once since using this method.

Perhaps some of the other readers of the "Bulletin" have tried "Sand Culture" also. If so, it would be interesting to get their opinion of it.

ALBERT TRUNDY.

FROM PONTIAC, MICHIGAN

I have been collecting cacti for about 12 years and I think it is the most interesting hobby that anyone can have. I have quite a large collection, 286 different cacti and 25 different succulents. I have 8 shelves on 4 wide French windows in a sun room and 4 other shelves on south and east windows where I winter the smaller ones. The large columnar types, vining ones and orchids I keep in the basement in the winter.

My husband built a hinged glass top plant stand where I put my choicest ones so I can protect them from heavy rains in summer, others I put on a bench under our wide overhanging eaves, others I just set on a table on an uncovered porch where they get soaked. Have had pretty good luck with this plan and lost very few due to weather conditions, also have fair luck flowering plants.

The flowering, of course, depends on how much sun we get, I will have no winter or early spring blooms this year as we have had only 15 scattered days of a sunshine in the last 9 weeks, had 2 solid weeks of sunless days.

Another factor in not having any winter blooms is that we happen to be among the rationed fuel oil users and have been forced to do with less heat than usual this winter, however we are not affected as are the people farther east.

Rebutia minuscula never fails to bloom but so far there are no little red dots appearing around the base of the plant. I usually have 2 or 3 Echinocereus pop out with blossoms, too, they may do so later if we get sun.

I am sorry that the Bulletin is to be discontinued, but maybe I should be glad as they have aroused my interest to the point where I am now subscribing for the JOURNAL, which I had always planned on doing but just did not do.

I have a very good friend who also has a large collection of cacti and we get a great deal of pleasure out of comparing plants and their growth.

MRS. BERNICE MOORE.

Give fools their gold and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a field, or trains a flower
Or plants a tree, is more than all.

—*Whittier*

March 16. Just as the JOURNAL was going to the press with the above verse, we learned of the sudden death of Robert Poindexter. The shock to his cactus friends is great indeed. With his family, the entire Society shares the loss of one who can never be replaced. There was only one Robert and perhaps the above verse was written for him because he shared plants and flowers.

S. E. H.

VAN LAREN COLOR PLATES

From the imported color plates used in "Cactus" and "Succulents" by van Laren, we have made up a few sets of 50 different pictures from each of the books. The 50 cactus pictures are $2.50 and the 50 succulent pictures are $3.25 postpaid in the U.S.A. We have many inquiries for these rare plates and have finally decided to release them to Society members. Each lot of 50 is one-third of the original set and is invaluable for picture collections.

BOX 101, PASADENA

* * *

The following 40 page book is presented to their friends by Hummel's Exotic Gardens. This generous contribution may be used as an example for those commercial men who never contribute catalogues or information to the cause. One can only reap what they sow.

The Cactus and Its Body

By Dr. Leon Croizat

To study a living being, plant or animal, two are the methods. This living being may be killed and its body dissected under a microscope, describing everything of it in strictly technical language. Contrarywise, the live animal or plant can be analyzed and understood as it grows and moves. Once roughly understood, it may be compared with other live organisms to learn the full history of his evolution. The purpose of dissection in this case is merely that of ascertaining the true nature of details hidden to the eye.

In theory, the method which relies upon dissection as an end in itself, and the method of broad investigation and comparison which uses anatomy as a check are hailed as of equal value. In practice, the former is followed much more frequently than the latter. What is the reason for this I do not know, but I have heard cynics pointing out that a profound knowledge of life and a vivid yet disciplined imagination are needed to do constructive work. These cynics affirm that a book can be written about the leaf of an Ash by somebody who has never seen that of an Oak but that creative research must be carefully prepared, with a broad foreknowledge of what is to be looked for. Pasteur, one of the greatest creative minds of all times, was wont to say—these cynics add—that knowledge only comes to those who are prepared to recognize it when they see it. Whether these cynics are right or wrong I do not know, but I am sure that Nature is full of contradictions. Life on earth is so prodigiously rich that suitable examples can always be dug out to show, for instance, how an organ becomes another by degrees. Unfortunately this very wealth overwhelms the unimaginative student, and may ultimately repel anyone but the stubborn seeker willing to take the pain necessary to find a needle in a haystack.

Hundreds of pages have been written by anatomists on the tubercle (nipple or podarium) of the Cactaceae, the same problem having been worked in and out for a century by different authors with indifferent results. Nobody agrees as to the nature of this organ, whether it is "leaf" or "stem," simple or compound. We know everything about the course of the fibro-vascular bundles (the veins or nerves in the plant, so to speak), where they begin, where they end, how many cells thick is the corky layer underlying the spine-cluster, what is the microscopic structure of the finest hair in the areole. What we do not know is whether the tubercle of *Coryphantha* and that of *Opuntia* have the same origin; whether the groove that runs through the tubercle of *Coryphantha* means much or little for classification; whether separate genera may be accepted for plants that have, or not, glands near the spine-cluster. In brief: what we do not know is how Cacti must be classified, this because we are still in the dark about the ultimate significance of their morphology.

I will try to answer some of these questions in popular language. Obviously, I do not presume to return final answers, for Nature is very big and I am quite small. It has taken her millions of years to put the finishing touches upon the organs which I live to study only a few summers. The mind of man is not strong; issues that involve a consideration of endless time and boundless space stagger it into believing and pretending much sooner than into thinking and confessing. Of one thing I am reasonably assured: the outline suggested in these pages is worth accepting not as the truth but as an introduction to deeper and wider investigations.

Everybody in California knows the showy Bougainvillea even as everybody in the East is familiar with the Bittersweet. If we observe a flowering branchlet of these plants we notice the presence of two buds set immediately above the leaf. Of these buds one is dormant, that is, does not break into growth but waits to send forth a branchlet at the proper season; the other immediately yields a flower or cluster of flowers. Figure 1 shows the Boungainvillea's leaf, dormant bud and flower bud, the last already in bloom. In the Bittersweet (*Celastrus*) the flower-bud is located below the dormant bud, but in nature such a difference as this rates as mere detail.

Let us suppose that the dormant bud yields right away a small shoot (a brachyblast, in botanical language) while the flower-bud slumbers on. Let us suppose, moreover, that the first pair of leaflets at the base of the shoot (prophylls) are comparatively large, possibly fleshy. These suppositions do not sin against the run of known probabilities; their outcome is shown in Fig. 2, presenting an arrangement which is strongly suggestive of a primitive Cactus, *Pereskia aculeata* (Fig. 3). The differences that may separate the hypothetic plant in Fig. 2 and the *Pereskia* in Fig. 3 are trifling, at bottom, but it is desirable to account for them here. The shoot

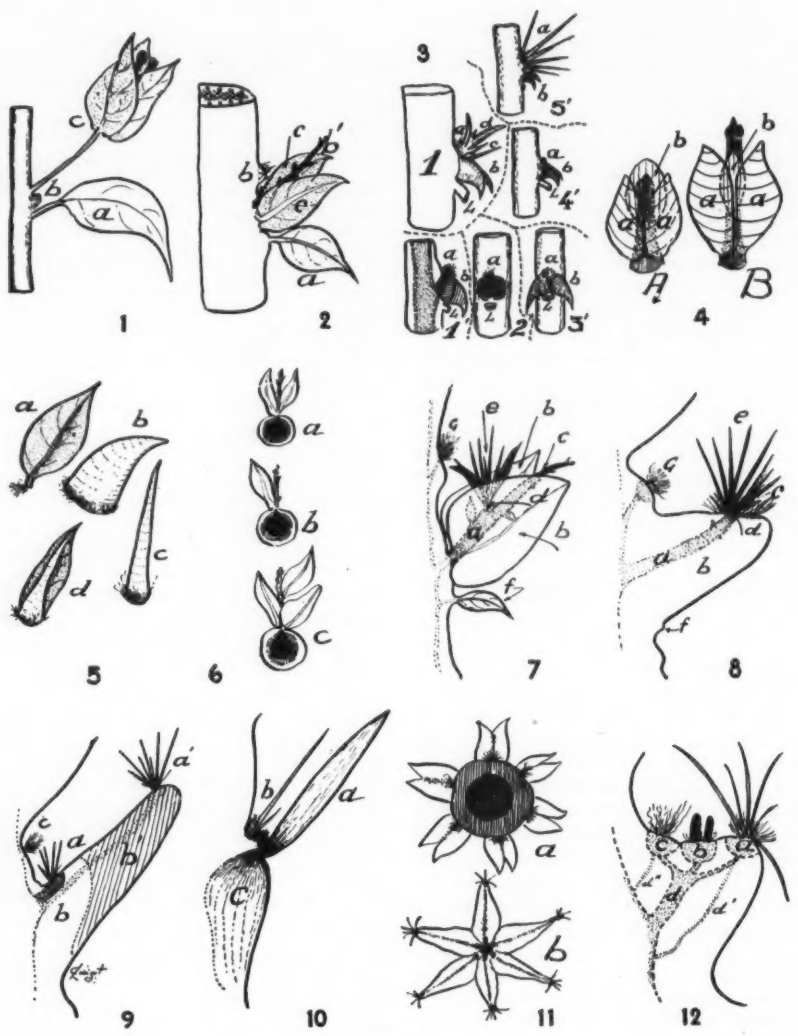

FIG. 20

FIG. 1—Bougainvillea in blossom: *a* the leaf, *b* the dormant bud, *c* the flower-cluster.

FIG. 2—A diagram based upon Fig. 1: *a* the leaf, *b'* the branchlet (brachyblast) with *c* its leaflets (prophylls); dormant bud in *b*.

FIG. 3—*Pereskia aculeata*: 1 (from life)—Above the leaf (cut out in *L*) stand two hooked prickles, *b;* the bud is breaking into growth, the scale *c* being a needle-like spine of sheer cactoid pattern, the scales *a* and *d* modified leaves (see also Fig. 5, d); 1' (from life)—Section to show length of the bud, *a,* and its position in relation to the hooked prickle, *b;* 2'—The bud, *a,* showing between the scars of the removed hooked prickles; 3' (from life)—The two hooked prickles, *b,* above the leaf, *L.* The bud in *a;* 4' (from life)—Lateral view of 3'; 5' (from life)—An old areole with cactoid spines *a,* above the hooked prickles, b.

FIG. 4—A diagram to show the practical difficulty of distinguishing between a "bud" (in A; *a, b* the bud-scales) and a "branchlet" (in B, same lettering).

FIG. 5—Leaf and prickles of *Pereskia aculeata* (from life); *a* the leaf, *b* the hooked prickle, *c* the needle-like prickle, *d* an intermediate between the leaf and the prickles. See also Fig. 3.

FIG. 6—A diagram to show the basic lack of difference among "branchlets" (brachyblasts) with 1, 2 or 3 "leaflets" (prophylls).

FIG. 7—A diagram to illustrate the elements entering the formation of the tubercle of certain Cactaceae. The main leaf in *f; a* the "branchlet" (brachyblast) shown in transparence between the "leaflets" (prophylls) *b,* its tip emerging in *c; d* the bud on the "branchlet" (brachyblast) with partly spiny scales emerging in *e; g* the flower-bud.

Continued on next page

of Fig. 2 becomes a bud in Fig. 3, and the leaflets are turned into hooked prickles. As stated, these differences are not important. The "bud" of *Pereskia* is fairly long, and its course can easily be traced back between the prickles, where it appears as a slender rod or branchlet. Occasionally, the prickles can be pulled out in such a manner as not to damage the "bud," which is then clearly seen in relief between the scars, like a tiny branch fusing with the main stem. Naturally, it proves impossible to establish a sharp distinction between a "bud" and a "branchlet" whenever these two organs are much alike (Fig. 4). Likewise, it proves impossible to draw a dividing line between the leaf of *Pereskia aculeata* and its various bud-scales, hooked prickles and needle-like spines. In this Cactus all these structures are connected by intermediates (Fig. 5); the green and tender scales of a shoot which immediately breaks into growth (Fig. 3, 1) are the factual counterpart of the truly cactoid spines of an old bud (Fig. 3, 5′) apt to become active only after years of dormancy. A careful observer of this species of *Pereskia* does not need a microscope to learn that the prickle and the bud-scale are basically the same structure, and that both are derived primarily from a leaf.

It may, and does happen that the hooked prickles of *Pereskia aculeata* are somewhat slow in coming out and that they number one or three instead of two. These happenings, although not frequently mean little, because nothing radically changes (Fig. 6) if the "shoot" bears sooner or later one, two or three "leaflets" at its base. *The fundamental fact is that the "shoot" and the "leaflets" merge here to form a cladode.* A cladode is a body which is neither wholly leaf nor stem, witness the prickles of *Pereskia aculeata* (which are leaves) fusing intimately with the bud (which is a shoot) so as to create a new body that is no longer fully leaf nor shoot. Cladodial structures are by no means rare, although the fact is not generally known.

We may now take a step further, supposing that the shoot (brachyblast) itself carries a bud with more or less prickly bud-scales (Fig. 7), and that all the organs in its immediately vicinity ultimately fuse together on account of a general increase in succulence. The outcome of this fusion (Fig. 8) is a true cactoid tubercle, with its spine-cluster. Once formed, this tubercle needs not remain inactive; as a matter of fact, it may gain in length (Fig. 9), the new growth taking place in this or that direction (differential growth; intercalary growth), with the result that the prickly bud (spine-cluster) and the flower-bud may be shifted toward the tip of the tubercle, crowded together, kept apart and the like.

Right here we may conclude as follows: (1) Direct evidence is available to the effect that the tubercle of a Cactus may be a cladode, arising from the fusion of several organs in a more or less advanced state of adaptation and succulence; (2) The tubercle may be modified in form and characters by conditions which precede or follow its coming into being; (3) The spine-cluster is a specialized bud (which has long been known to the anatomists) bearing spines (prickly bud-scales) that are leaves in origin; (4) The leaf that would normally be found immediately below the tubercle disappears either by abortion (which seems to be the case), or by fusion with the tubercle.

The conclusion that some tubercles are of cladodial origin should not blind us to the fact that other tubercles may have entirely different nature. It is probable, for instance, that the tubercle of *Opuntia subulata* (Fig. 10) is a mere expansion of the base of the main leaf, and that the "leaflets" of the "shoot" (prophylls of the brachyblast) take no part in its formation. Accordingly, we may suspect that in certain Cacti (*Coryphantha* for instance) the main leaf has been eliminated by the dominance of the "leaflets" of the "shoots," these being the prime ingredient of the tubercle. Contrarywise, in *Opuntia* the main leaf has apparently been the stronger and the one to establish the tubercle. To discuss these alternatives in full would be exceedingly interesting, but this is here impossible. In conclusion, we may tentatively state that the cladodial tubercle is characteristic for certain Cactaceae, while the tubercle formed by the

Key to plate on opposite page—continued

FIG. 8—Diagram to show the outcome of the fusion of the organs and parts of Fig. 7. Lettering same as in Fig. 7.

FIG. 9—Diagram to show how the further growth of the tubercle (*b′* hatched) can shift the spine-cluster, *a*, to a new position, *a′*. In *b* the original tubercle; in *c* the flower-bud.

FIG. 10—Tubercle of *Opuntia subulata* (semidiagrammatic); *a* the leaf, *b* the areole, *c* the tubercle formed by an expansion of the foot of the leaf.

FIG. 11—Diagram to illustrate the basic similarity of disposition between the hooked prickles of *Pereskia aculeata* (in *a*, with the leaves removed) and a species of *Coryphantha* (in *b*, the section through the stem much narrowed).

FIG. 12—Diagram to show the emergence of glands, *b*, from a bud located between the spine-cluster, *a*, and the flower-bud, *c*. These three buds (i.e., spine-cluster, gland-bud and flower-bud) may be connected by a single strand of vasculation, *d*, branching above, or served by independent connections, d, d′, d″ (Diagram based on *Hamatocactus setispinus*).

foot of the leaf alone is normal for the great majority of succulents, including among them the Ocotillo (*Fouquieria splendens*). The horny cover of the hooked prickles of *Pereskia aculeata,* however, has the same origin as the shell coating the spines of the species of *Euphorbia* that have two or more prickles.

Is it possible to draw a line of absolute separation between the two kinds of tubercles? *My answer is yes, but in theory much sooner than in practice.* A compound tubercle of definite cladodial origin can be so thoroughly modified by a later evolution as to lose practically all the earmarks of its primitive nature. A wing-like rib like that of a *Cereus,* for example, could be set up by simple tubercles like Opuntia's running together or be formed, contrarywise, by the fusion of flattened out cladodial structures. What seems to be certain is that the tubercles of a "winged" species of *Rhipsalis* are essentially different from those of *Coryphantha* and *Mammillaria.* It would seem to be clear, moreover, that the ancestor of all Cacti was a creeper or climber, strongly tending to become succulent and to bring forth bud-scales peculiarly hard and needle-like. From this ancestor—which had nothing in common with *Mesembrianthemum* but a great deal of affinity with the group of *Dillenia*—first arose *Rhipsalis* and *Pereskia,* which *both* are primitive for the family as we now know it. The *Pereskia* affinity itself yielded two main branches, one (of which *Pereskia aculeata* would seem to be the lone living relic) giving rise to the Cacti with cladodial tubercles; the other fathering *Opuntia* and its allies. All this is sheer speculation, of course, but it suggests possibilities which are interesting and far from useless for practical classification.

The wool of the cactoid areole has been carefully studied on the anatomical side but hardly if at all otherwise. My impression is that this wool arises by either one of two processes, that is: (a) Tissues normally intended for leaves or prickles are decomposed throughout, ultimately appearing as hairs; (b) Structures that are reduced, adapted or subjected to stresses in any sense become hairy. The latter of these possibilities is probably the true one, witness the mane covering the "shoot" (brachyblast) which carries the flower, or flowers, in the affinity of the Cerei with a cephalium. Hairs, in addition, usually occur on reduced and specialized structures of all kinds, branchlets, inflorescences, bud-scales and at the forks of the veins in many leaves. Certain authors have argued that since hairs of the same nature appear in the areoles of *Cactus* and in the axil of a leaf of *Anacampseros,* these two plants must be closely related. This is a mistake because hairs like those of *Anacampseros* are sometimes found in *Othonna.* Since *Othonna* belongs to the Compositae (the Daisy family), nobody will venture to argue that *Cactus* and *Anacampseros* are its next to kin. A whole trend of evidence indicates that the wool of *Cactus* is not a "special problem," but one of the aspects of the general issue of pubescence in plants, and as such it may be dismissed here.

On the strength of the tentative conclusions so far reached it proves possible to deal with a number of questions that no one has ever answered. It is well known that many Cacti are quite variable in the color and number of their prickles and that classification breaks down, for instance, when it attempts to tangle with certain groups under *Echinocereus* and *Mammillaria.* These plants do not stay put, and every individual would seem to be at least a "variety" of its own. Knowing that the spine-cluster is an adapted and specialized bud—*but a bud, nevertheless*—we can readily understand that this bud may be more or less "dead," that is, more or less set within a fixed pattern. In *Echinocereus Reichenbachii,* an old spine-cluster may revive and put out new, whitish spines at its top when the stem starts to grow again. This is very noticeable in collected plants, the line of demarcation being sharp *in the same areole* between the old and filthy spines and the new, clean ones. Whether this resurrection of an old areole takes place because the areole is still alive, or because each areole actually consists of several buds more or less intimately connected, some alive others "dead," I do not know. These and similar details cannot deeply interest a classifying botanist and their definition is properly entrusted to a specialized morphologist. The fact which counts is that the spine-cluster is a bud or a group of buds, and that the vegetative powers of these buds may be spent altogether or be active to some extent. To measure this activity in hundreds of species of Cactus is not a trifling undertaking, considering that hardly anything could be more difficult than the task of determining whether a body is alive at the rate, let us say, of 25% or 35% of its fullest powers. Taking things as we now find them, we should readily admit that two spine-clusters, one dead 100%, the other alive 10% may behave differently. In *Echinocereus triglochidiatus,* for example, the number of spines in a cluster is not constant, several "varieties" having been recognized on this account. The color of the individual spine, moreover, is primarily determined by the microscopic structure of its tissues, it being natural that a leaf fully adapted as a prickle and spinescent 100% differs in hue, and possibly in form, from another which is so adapted only in the ratio of 85%. In conclusion: neither the spine-cluster nor its prickles are always and necessarily dead *as buds,* which

explains why three plants of the same close kinship, but having spine-clusters alive, 25%, 45% and 70%, may look as three perfectly good "varieties," and be connected in turn by endless "forms" with spine-clusters alive 30%, 50% and 65%. The fact we must constantly reckon with in our work is that large aggregates exist which *tend to specialize* in certain directions, some of their forms *tending to have,* for instance, six prickles of white color while others are *inclined to have* five in a reddish hue. To coin as many "species" as are the differences of detail leads nowhere; all *these tendencies,* involving slight differences in the degree of vitality and specialization of the spine-cluster and its prickles, are primarily ruled, no doubt, by hereditary factors, which should and could be investigated with appropriate means. However, the hereditary factors in their turn are affected by hybridization, adaptation to certain soils and locations, the outcome of all these factors at work being a hodge-podge of countless forms, the "species" itself having uncertain limits. Looking to the spine-cluster *as a bud* and to the prickle *as an adapted leaf* we are enabled to grasp the possible causes of variations that are otherwise absolutely baffling. Naturally, understanding a problem does not yet mean to solve it, but the surest way of not solving it at all is to neglect to think about its fundamentals.

It seems altogether probable that the groove of the tubercle of *Coryphantha* is the ultimate counterpart of the groove which divides the hooked prickles of *Pereskia aculeata.* Accordingly, this groove may still represent in *Coryphantha* the parting line between the ancestral "leaflets" (prophylls) by which the tubercle was primarily built. Thus the groove may be looked upon as a relic of evolution and a primitive character, the similarity of pattern between the hooked prickles of *Pereskia aculeata* and of some species of *Coryphantha* (Fig. 11) being far from casual. All investigators of the Cactaceae have so far been puzzled by the fact that the tubercles of a young plant of *Coryphantha* are ungrooved, and that the groove begins at their tip rather than at their foot. The puzzle vanishes if we stop to consider that primitive characters do not always manifest themselves at first, and that the ancestral "leaflets" forming the tubercle would be less intimately fused at their tip than at their base precisely as are the hooked prickles of *Pereskia aculeata.*

It is peculiar of many plants, including the Cactaceae, that characters belonging to the young plants of certain groups appear in other groups at all ages. Thus, the feathery spines of the seedlings of *Mammillaria* do not persist in the adult with the exception of *M. plumosa* and its next of kin. Much for the same reason, seedlings of *Encephalocarpus, Solisia, Pelecyphora* and *Epithelantha* closely resemble each other, while the mature plants sharply differ. The ungrooved tubercle of an adult specimen of *Mammillaria,* accordingly, is the full match of an ungrooved tubercle in a young plant of *Coryphantha.* The question arises next whether the groove may separate generically *Coryphantha* from *Mammillaria.* Not so long ago I would have answered this question in the negative considering, for instance, that heads with grooved and ungrooved tubercles may occur on the same plant of *Coryphantha aggregata,* but a careful study of *Pereskia aculeata* and its hooked prickles has modified my earlier belief. Since the groove-character can be charged to a significant difference in the life-history of the tubercle, it is legitimate to use it to set apart plants as different as *Coryphantha robustispina* and *Mammillaria plumosa.* Whether the groove-character can be used to separate *Ariocarpus* and *Roseocactus* as genera is a moot question because these groups are small and strongly specialized, with or without a groove. Genera are not written in and out the record on the strength of a technicality, circumstantial evidence, tradition and convenience having at least as much weight in the making of a genus as the presence of a groove one centimeter long on the tubercle. No generic significance whatsoever can be attached to the presence of glands in certain Cacti, because these glands are hardly better than prickles which persist as soft, oftentimes exuding processes. These glands may belong to the spine-cluster or be emitted by buds of their own, as shown in Fig. 12, for instance, without this having a special meaning for classification. Glands normally occur on *Opuntia* and *Hamatocactus,* but no one will assert that these plants are closely related. Some Cacti are known which exhibit spines of a different nature, hard or soft, even in forms belonging to the same immediate affinity, and these vagaries are believed by certain cactologists to indicate the presence of different genera. The readers of these pages will agree, most likely, that the differences in question are less important for classification than they may seem to be at first, because they merely represent variable states of the same entities. Worthy of notice is the fact that seedlings of unrelated genera like *Utahia* and *Toumeya, Encephalocarpus* and *Pelecyphora* happen to resemble each other closely, the generic characters manifesting themselves in the Cacti only with age. This fact suggests that these groups are comparatively new, that is, genera which have arisen by secondary modifications, the seedling alone bearing now witness to the primitive uniform condition. Naturally, these young genera may be several millions years old. The presence

of *Rhipsalis* in Asia, Africa and America is certainly not to be credited to the kind ministrations of birds flying seeds over three continents, between Bahia of Brazil and Ceylon in India. This is an ancient distribution, possibly fifty million years old, if not more. As a counterproof of the hoariness of the Cactaceae as a family, *if not as individual genera and species,* stands the fact that closely related species of *Melocactus* are endemic to Brazil, Peru, Mexico and the West Indies, which bespeaks a distribution not less than twenty million years old.

Requirements of space forbid my writing further, but the reader may now easily work the thoughts suggested by these pages into his own curiosities. I will close these lines with a naive question. If I am not mistaken, the hooked prickles of *Pereskia aculeata* are found in no other Cactus. The importance of these prickles for a study of the Cactaceae is not trifling. It is commonly believed that these hooks are the gift made by a kind Nature to *Pereskia aculeata,* meant to assist the young shoot to climb and to enjoy the blessings of sunshine and fresh air up in the canopy of the tropical woods. Nobody ever seems to have thought that Nature would be funny rather than kind in bestowing upon *Pereskia aculeata* the hooked prickles denied to the remaining species of the genus. Did Nature cherish *Pereskia aculeata* but hate every other *Pereskia?*

This contribution is from Book Mark who says the following is old enough to have a cephalium but is still good:

A certain Jefe Politico in Mexico was requested by the governor of the state to render a report on the fauna and flora of his district. A second more peremptory demand for the delayed report is said to have elicited the following:

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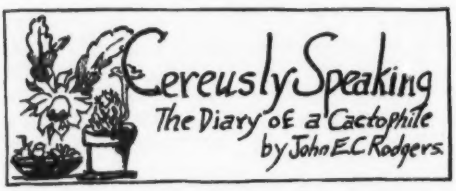

CULTURE IN OHIO

March 1. Like a lion—snow flurries, wind and cold. Satisfied my urge to invest in more pleasure. Went to Louis Feher's, Cleveland. A poet and a dreamer of dreams in a greenhouse full of cacti and succulents for the purpose of making a living. Louis is trying to reduce his stock as he is going into the army this month. ("Feher"-ocactus Louigi, non prolifer-a, non prolifer-us, so Uncle Sam is taking him.) Bought several succulents to liven up my collection. Went to H. J. Lutton, 1309 Plainsfield, So. Euclid, who has a thriving cactus business in his basement. Keeps plants in dry sand the short time he has them. Vows he must cut his stock to 20 or 30 species at a time for the duration. The plants were fine. Couldn't resist a 3-foot *Cereus peruvianus,* top cutting and a 6-inch *Echinocactus Lecontei.*

Mrs. Mower, Sandy and I drove to Strongsville and stopped at E. J. Fish's greenhouse and tried to pry him from some of his pets. He has his collection with his plants-for-sale which makes me avaricious. His large *Chamaecereus* has 25 or more buds. Had a small piece of it started for me. Got what I could along with promises for starts of some of his rarer items. Epiphyllums and brightly colored succulents in bud in his collection. *Othonna crassifolia* (Fig. 138, "Succulents for the Amateur") with tiny daisy-like yellow flowers, makes effective hanging baskets from his greenhouse framework. At Hirt Brothers, across the road, I found 17 newer seedling cacti under a bench of flats of vegetable plants. Saw hundreds of dish gardens which they wholesale to concerns in these parts. These boys are both working in a defense industry in Cleveland, run this greenhouse-nursery-succulent roadside stand, and are laying the ground work for all out Victory Gardening program for the summer. Work doesn't kill,—just worry.

March 2. Surprise. *Lophophora Williamsii* in bloom. Earliest it has ever bloomed for me. Verified buds on *Epiphyllanthus obovatus* and *Selenicereus spinulosus.* There is one pest in greenhouses generally that I have visited—those little black ants with "B. O." which carry their thorax in a vertical position—they have not moved into my house as yet—but I am on my guard.

March 3. Sandy went in to Mills Seed Store here today to get me a supply of "Black Leaf 40" and what do you suppose? She found quart sizes of "Sheps" my favorite spray, which I have only had, up to now, in 10-cent sizes. According to the label, "Sheps" is made by the Shepard Laboratories, Council Bluff, Iowa. Now, let us spray!

March 5. Oh, I say, Scott! Two of your contest plants are blooming. I've watched those buds for two weeks, and today's sunshine did the trick. Both *Mam. elongata.* One is in normal soil, normal watering and light. The other is in richer soil, same watering and light. Am I among the winners? (Just as your editor was about to announce that he was the winner of his own contest with two *Mam. elongata* in flower during February, along comes John Rodgers claiming the glory. It is interesting that this plant is flowering the same time under glass in Ohio and out of doors in California. If any of the experimenters have anything

additional to report, please send it in now before we print the summary in the JOURNAL. S. E. H.)

My cutting boxes are full—I feel just like the spider sitting in his parlor waiting for the fly. I may have some cuttings of plants not found in all collections. I DO like to trade—er—did you say something? (Adv.). Aloes look so pretty in the sunlight.

March 8. In Severance Hall, Home of Cleveland Symphony Orchestra. A musical treat, but why should our American architects prefer the use of the papyrus, acanthus, and the lotus of the Nile, to our native flora —Yes, I mean cacti. Can you imagine anything lovelier than a *Carnegia gigantea* column or an *Echinocactus* chandelier?

March 11. Had a long letter from Lloyd W. Fisher, Lewiston, Maine. Professor of Geology and Geography at Bates College, there. Sent me a list of his collection and some pictures. He has reached the stage where all his windows are filled with plants and fills up a sun porch in the summer time. Says he recommends thin muslin shades between the plants and the windows in summer. I see he knows what scald, bleached plants and rapid drying means to cacti. He puts this item on the credit side of the war ledger: "This winter with fuel rationing, our landlord has not been able to give us the heat he used to and as a result all of my plants have done better."

I sit and shiver at some of the 20 degree and 40 degree "belows" some of my friends are writing to me about. Imagine, Messrs. Marshall and Bock, raising cacti under such conditions!

March 15. All out of breath—Me—the last minute man. Cleaned inside of glass with mop contraption. Only a few hours before the Midwest Society meets here. Sandy has been telling me I'd be caught and I am, dammit. I am anxious to see the gang, but I have to make room for them to get into the greenhouse—plants all over the place. Finished shoving whatever was in the way under the benches. "He who stoops"—will be shocked . . . 10:00 p. m. and all is quiet. They came, saw, and have gone. The improvements I have made in the entrance met with the approval of my associates. Plants, buds, and flowers put on a passable show for me.

March 17. Wish I had read that translation from the German from Monatschrift: "South American Cacti" by Curt Knebel in the January, 1942, "Desert Plant Life," before I talked in Cleveland in February. The article is called "Something About Echinopsis." Knebel points out that those plants with excessive off-sets are usually shy bloomers. (Haven't I found that out, too.) He also points out that taking off the vegetative off-sets does not make the plants bloom (so sorry, I thought that also, but I do so want them to bloom). He thinks the ones we have are mostly hybrids which need "new blood" to restore them to us as the early collectors' "pincushion," the old favorits of our grandmother's day. We cactophiles (Ohio and Pennsylvania) have had *mirabilis, multiplex, oxygona, eyriesii, turbinata, tubiflora, calochlora,* and *Schelbasii* bloom, also *"albiflora"* which blooms from June to October here. Knebel says further "Echinopsis wish to grow. Must have much food and then will reward through this treatment with shining green stems and flowers." I use a porous soil, of thoroughly decayed straw, powdered clay, sand, and gravel. The only disadvantage to this soil is that root mealy bugs thrive if they get into it. . . . . .

March 18. Checked my seed list from my own plants and with a vision of blooms in 1947, I planted them in well marked rows in bulb pots. If it wasn't such a pleasure, I'd just drop them in, but each variety is such a marvel of color, construction, and shape that I use a magnifying glass and tweezers and put them gently in the soil with the hilum down, cover them over and tamp the soil lightly, then cover with fine gravel. Next I set the pot in a pan of water until soil is moistened, cover with a piece of window glass, put in a warm place, and wait for germination. The only *Harrisia* that didn't set seed was *eriophora.* I shall know better this year, and hand pollinate it.

March 21. Spring? Ice in Lake Erie doesn't temper the winds for the shorn lamb, you bet. Cold breezes let us know where the North Pole is. Since all of the Aloes, Gasterias, and Epiphyllums have started to grow again, I trimmed out the dead leaves and stems, etc. I keep them on the dry side all winter (see Poindexter, JOURNAL June, 1942).

March 25. Peniocereus Greggii seems to be thriving in a 6-inch tile. The tuber weighs about 5 pounds. After two years of dormancy, I decided it needed steady moisture and less change of temperature at root ends. The finest ones I have seen have been planted in small oil drums, greenhouse beds, or those in pictures seems to grow under shrubbery. Put an extra allowance of agricultural lime and charcoal in the sandy loam. I also used some rotted animal fertilizer. If I lose it, I lose it.

March 29. Corryocactus melanotrichus not at all like the other two of the genus. Is very cespitose, but a good greenhouse grower, if you don't expect much. *Bergerocactus Emoryii,* another one for which I hold my breath, looks like sticks with yellow bristles on them so thick that no green shows through.

Culture Cues for April

1. Check Stapeliae for stringy growth, black fungus, and yellows. Give a top dressing of rich soil, and plenty of light.

2. Check plants that budded last year and then aborted due to giving too much heat and water. Go slow. Also—note that there are plants that need to grow while setting buds.

3. Keep source of quick heat on hand, electricity or oil (if priorities permit). An extended drop in temperature at this time will blast buds.

4. Pot up rooted offsets on Haworthias, Gasterias, and Aloes, which will not injure the shape of the parent plants, and label. I have in mind some species in other collections for which I hope to make a trade (Adv.).

5. Study best place for outside bed to sink pots in sunshine, with good drainage, and shade at noon—points for consideration.

6. Temper spring sunshine. (I use muslin strips thumb tacked to greenhouse bars until after the spring rains when I use white wash on the glass which I repeat at intervals.)

7. Sprinkle plants in full growth in early evening with tepid water. Heat of early spring sun dries plants out quickly.

8. Re-check Epiphyllums for buds and feed liquid manure to insure further development.

9. Try hybridizing (tell 'em how, John. S. E. H.) a few of the flowers in the Cereii group as they bloom. Keep careful records of dates, crosses made, etc. Watch the development of the cactus berries.

10. Special attention should be given the following plants which have bloomed for me in April in previous years: *Lepismium communis, Rhipsalis Cassytha, Lophophora Williamsii, Frailia Grahliana* and *pumila, Gymnocalycium platense, Rebutia kupperiana, Aporocactus flagelliformis, Ferocactus uncinatus, Echinocereus Reichenbachii, Malacocarpus Hennisii,* and *Gymo. denudatum.*

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